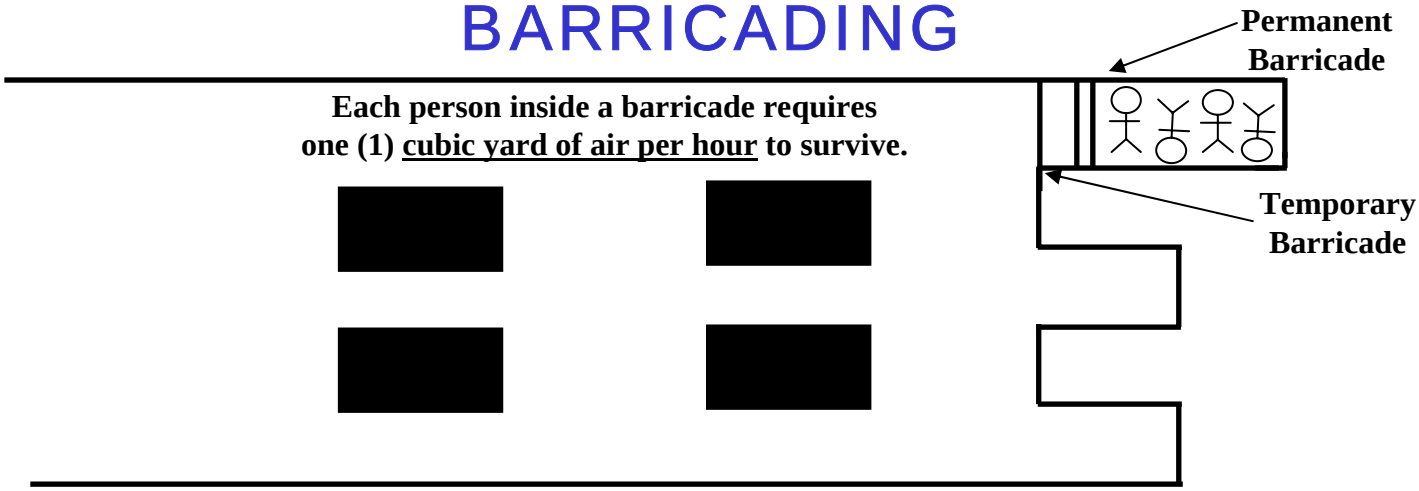
Virginia Department of Mines, Minerals and Energy

HAZARD **A**LERT **L**IVE **T**OMORROW

BARRICADING



In the past, coal miners have saved their lives by barricading following mine fires and explosions when mine entries to the surface were blocked by physical obstructions (roof falls, water, etc.) or contaminated with poisonous gases including carbon monoxide, carbon dioxide and other toxic fire/ignition gases. Barricades are the last resort and must be airtight. Past mine fire and explosion investigations have revealed that miners survived the initial event but later perished inside barricades that were not constructed airtight.

PROCEDURES FOR BARRICADING:

- **Collect tools, timbers, ventilation curtain, water, dinner buckets, sealing agents, etc. when entrapment is imminent and/or passageways to the surface are blocked by physical obstructions or contaminated by poisonous explosion/fire gases;**
- **Identify a suitable location for erecting a permanent barricade following the incident; select as large an area as possible, preferably with only one opening;**
- **Short circuit the ventilation outby the identified permanent barricade location as available time and conditions allow;**
- **Begin temporary and permanent barricade construction without delay after the decision has been made to barricade;**
- **Build one or two temporary barricades outby the permanent barricade location with ventilation curtain as soon as possible to reduce or prevent entry of air that may contain poisonous gases into the intended barricade area;**
- **Place a sign, note, etc. outside the barricade to show that personnel are behind it;**
- **Build a permanent barricade with concrete blocks, crib blocks or multiple layers of ventilation curtain framed with timbers if blocks are not available and seal with a sealing agent, if available. Seal the top, sides and bottom of the barricade. Construct as airtight as possible. Timeliness in building an airtight barricade is critical to survival;**
- **Limit activity inside the barricade to conserve oxygen. One person should walk around periodically to mix the air. Never congregate in one place. Conserve the use of cap lights, water and food.**

SEE OTHER SIDE

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For additional information or assistance, contact the Division of Mines, Big Stone Gap (276) 523-8227 or Keen Mountain Office (276) 498-5433

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CARBON MONOXIDE

CO is formed in coal mines during mine fires or explosions of gas and coal dust and in the blasting or burning of explosives. CO is extremely poisonous and has an asphyxiation (suffocation) effect on people, even in very low concentrations.

CHARACTERISTICS:

1. **Is invisible, colorless, tasteless and odorless;**
2. **Has a specific gravity of .967 (lighter than air);**
3. **Is explosive from 12.5% to 75%;**
4. **Is a product of incomplete combustion and is formed in burning any type of fuel or carbon – containing substance;**
5. **Is detected with carbon monoxide detectors.**

ACTION ON THE BODY:

CO exerts its extremely dangerous action on the body by displacing oxygen from red blood cells. Red blood cells absorb oxygen from air in the lungs. Red blood cells absorb CO - 200 to 300 times faster than oxygen. CO absorbed into the red blood cells reduces the capacity of the blood to carry life-sustaining oxygen to body organs.

PERCENT BY VOLUME	PARTS PER MILLION (PPM)	
.01	100 PPM	Allowable for exposure of several hours
.04 to .05	400 to 500 PPM	Can be inhaled for 1 hr. without appreciable effect.
.06 to .07	600 to 700 PPM	Just noticeable effects after 1 hr. exposure
.10 to .12	1000 to 1200 PPM	Unpleasant, but probably not dangerous after 1 hr.
.15 to .20	1500 to 2000 PPM	Dangerous for exposure of 1 hr.
.4 or more	4000 PPM or more	Death in less than 1 hr.

The generally recognized maximum allowable concentration of CO is .01 percent (100 PPM) for an eight (8) hour exposure in normal air. Higher CO concentrations may be considered allowable for shorter periods of exposure.

OXYGEN

CHARACTERISTICS:

1. **Is required to support life;**
2. **Is colorless, odorless and tasteless;**
3. **Has a specific gravity of 1.1054.**

ACTION ON THE BODY:

21% - contained in normal air

17% - causes deeper breathing and a faster rate

15% - causes rapid heart rate, buzzing in the ears, dizziness, headache, nausea, vomiting, general sick feeling

9% - causes unconsciousness

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